

Project title: Tailored Prepreg – Flexible process chain for the fabrication of fiber reinforced plastics made of semi impregnated, local adjusted fiber fabrics

Duration: 04/2017 - 03/2019

Funding: AiF-IGF

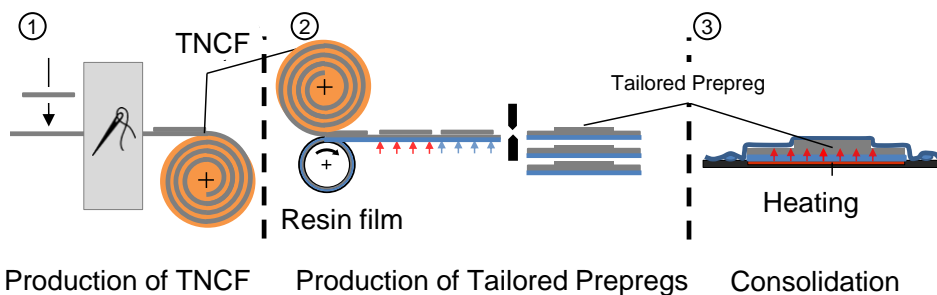
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21.08.2019

Mission Statement

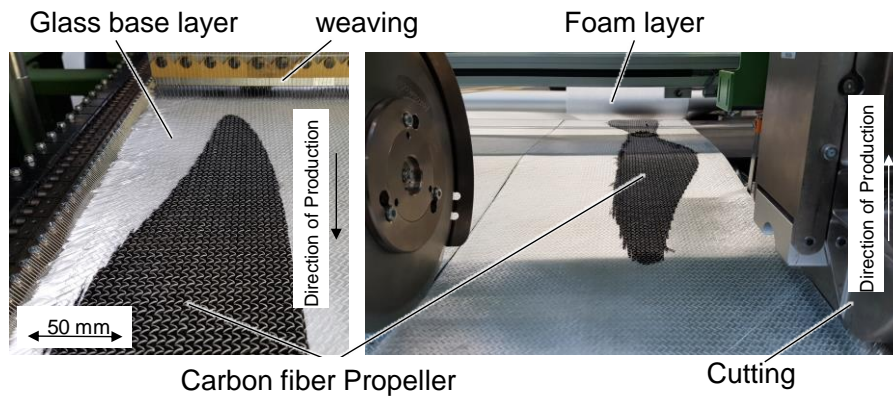
Multiaxial fabrics close to the final shape (TNCF) are near net shape pre-fabricated, depending on their purpose. They allow a material-efficient and productive manufacturing of fiber semis in an amount of 100.000 pieces/year. The purpose of this research project is the development of a process chain, that realizes a productive, SME-suitable manufacturing of FRP-components in an amount of 50.000 pieces/year. By using multilayer rovings, money for the process of impregnation and time in layer structure is saved in comparison to the use of unidirectional prepregs. In addition, local reinforcements in the textile fabrication reduce the waste of resin-impregnated prepregs.



Picture 1: Process chain "Tailored Prepreg"

Approach:

The process chain is developed and tested on the basis of a functional pattern in the form of a propeller. The propeller consists of 26 individual layers, which would have been impregnated according to classical manufacturing methods, then cut to size and then deposited by hand. In the new process chain, manual work steps are saved and the amount of impregnated waste is reduced. First, the carbon fiber layers are placed on a glass fiber base layer and then woven together fully automatically with high positioning accuracy. The result are so-called "Tailored Non Crimp Fabrics (TNCF)", shown in Figure 2. The TNCF are then coated on one side with a resin film in a continuous coating process. The distribution of the resin system in length and thickness direction takes place during the consolidation of the component. The fiber matrix semi-finished products produced in this process are referred to as partially impregnated prepreg because the resin film does not penetrate the entire layer structure of the TNCF.



Picture 2: TNCF semi finished product

The small flow paths enable component consolidation in the heated vacuum structure without the use of an autoclave. The finished propeller demonstrator could be produced highly automated and material-efficient with the new process chain. It is shown in Figure 3.



Picture 3: Propeller Demonstrator

The research project was able to show that the process chain is suitable for component production in the medium to high unit number range and can be implemented economically without high investment costs for the SMEs involved.

Acknowledgement

The IGF project 19441 N of the Forschungsvereinigung Forschungskuratorium Textil e.V., Reinhardtstraße 14-16, 10117 Berlin was funded by the AiF within the framework of the programme for the promotion of joint industrial research (IGF) of the Federal Ministry of Economics and Energy on the basis of a resolution of the German Bundestag. We would like to thank the Arbeitsgemeinschaft industrieller Forschungsvereinigungen for the financial support of this research project.

Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages

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